

‘Today is a new day to renew our mind this morning.
HAVE A GREAT MORNING



Pathology of hype:

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Intended Learning Objectives (ILOs)

By the end of this lecture the student will be able to:

1. Summarize the etiology, pathogenesis, pathological features and complications of hypertension
2. Compare between aetiology, pathological features and effects of benign and malignant hypertension
3. Summarize causes, types and complications of vasculitis
4. Correlate between pathological features, laboratory findings and clinical picture of Vasculitis.

Lecture Plan



1. Part 1 (10 min): Definition and types of hypertension
2. Part 2 (20 min): Aetiology & pathological features of essential hypertension
3. Part 3 (10 min): Types of vasculitis
4. Lecture Quiz (5 min)



Hypertension

Definitions:

Benign hypertension: *Gradual moderate rise of blood pressure $\geq 140/90 \text{ mmHg}$*

Malignant /accelerated hypertension: *Rapid rise of blood pressure $\geq 180/120 \text{ mmHg} + \text{ papilledema and retinal Hge \& exudate}$*

Accelerated hypertension: *is malignant hypertension*

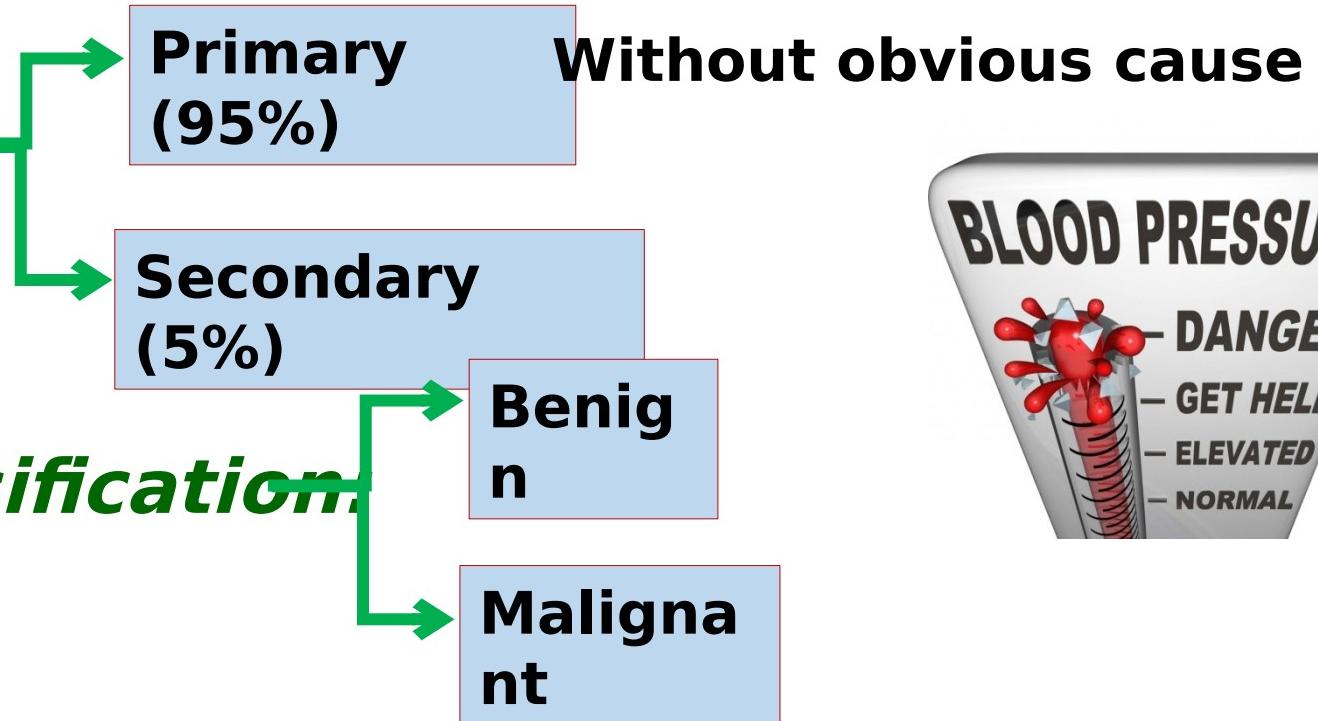
developing on top of benign hypertension

Hypertension

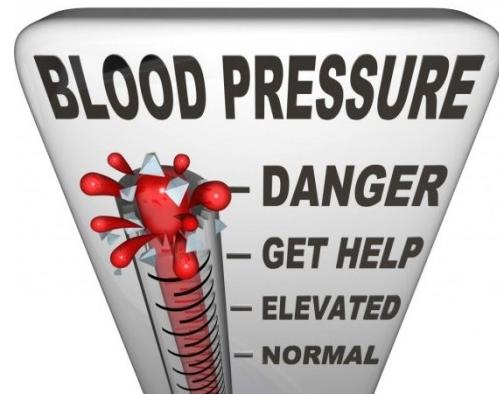


Classification:

☺ *Etiological classification:*



☺ *Clinico-pathological classification:*





Etiology of hypertension

Primary (essential)

1- Genetic factor:

- gene defects in enzymes involved in aldosterone metabolism e.g aldosterone synthase

- Mutations in protein affecting sodium

2- Neurogenic factors:

High sympathetic tone + Chronic stress

↓ Peripheral VC

↑ peripheral resistance

3- Humoral factors:

Renal artery VC ↓

Renal ischemia ↓

Renin secretion ↓

↑ angiotensin

peripheral

4-

Environmental factors:

- ↑ salt intake
- Obesity



Etiology of hypertension

.1
Renal

- Renal artery stenosis
- Glomerulonephritis,
- Pyelonephritis,
- Polycystic kidney

Secondary

hypertension:

.2
Endocrin e

- Pheochromocytoma,
- Primary hyperaldosteronism,
- Cushing syndrome.
- Hyper-estrogenism
- Hyper and Hypo-

.4
Blood

Polycythemia vera

.3
Vascular

- Coarctation of the aorta
- Polyarteritis nodosa

Pathological features of hypertension

benign & malignant

Pathological features of hypertension



Malignant hypertension Benign hypertension

**Rapid progressive rise
of BP $\geq 180/120$ mmHg
+ papilledema**

**Rare (medical
emergency)**

**Usually younger age
(25-35Y)**

Short fatal course

New Five Year Program

**Slow progressive rise
of BP $\geq 140/ 90$
mmHg**

**Commonest
Usually above 40Y
Long course**

Def

Incidence

Age

Course

Pathological features of hypertension



Malignant (hyperplastic) arteriolosclerosis

Benign (hyaline) arteriolosclerosis

Affects small arteries & arterioles

1- Vascular lesions:

- **Fibinoid necrosis (collagen fragmentation + inflammation ± thrombosis)**

- **Concentric hyperplasia of CT & smooth muscle cells wall thickening & lumen**

- **Hyalinosis of the intima & media with thickening of the vessel wall.**

- **Elastosis (splitting of internal elastic lamina)**

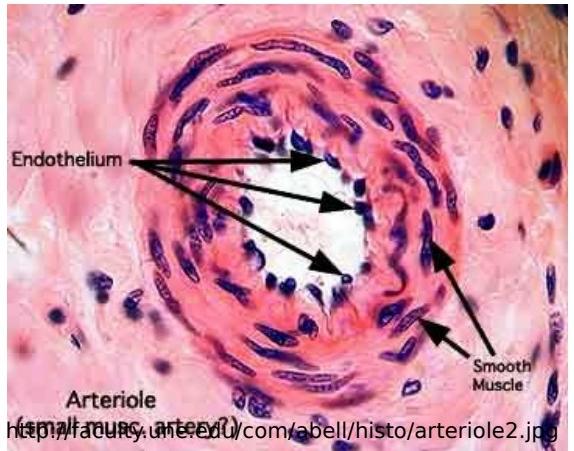
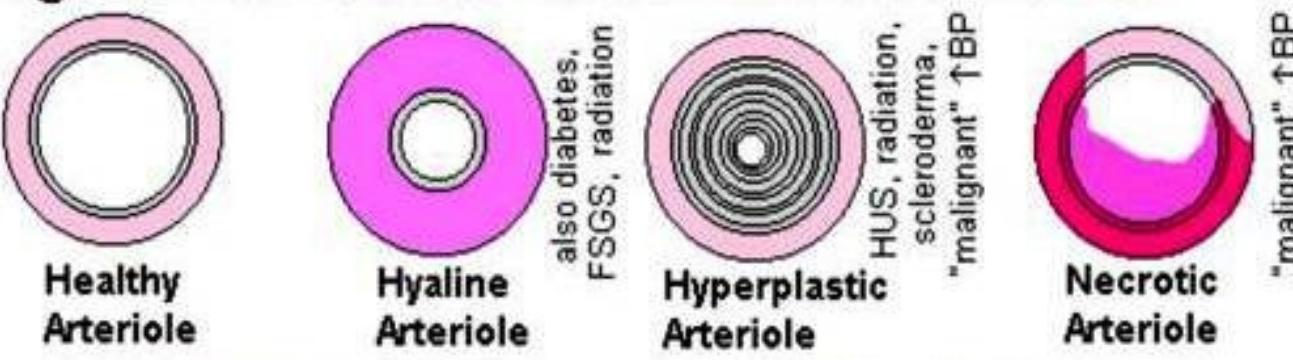
- **Atherosclerosis is**

Pathological features of hypertension

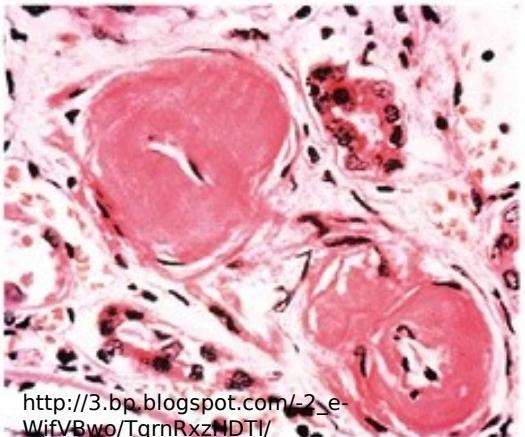


1- Vascular lesions:

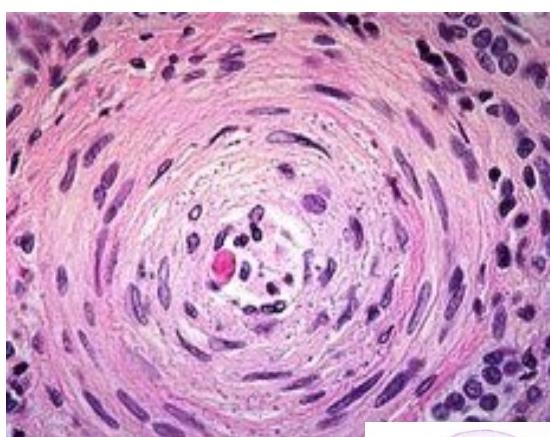
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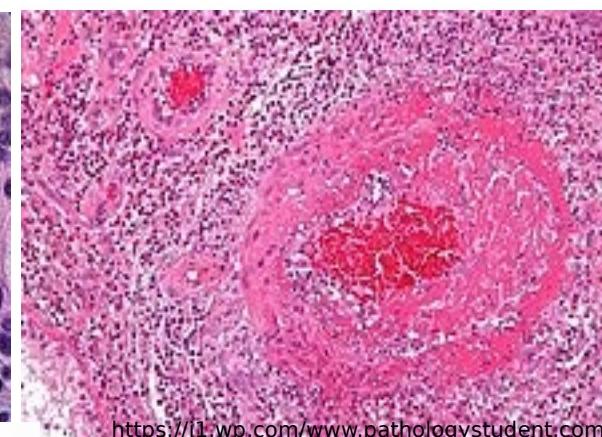
<http://faculty.ultr.edu/com/abell/histo/arteriole2.jpg>



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2fbdb



<https://i.wp.com/www.pathologystudent.com/wp-content/uploads/2015/12/fibrinoid.jpg?resize=450%2C300&ssl=1>



© Can Stock Photo

Pathological features of hypertension



Malignant nephrosclerosis

**Normal
Smooth
Strips easily**

**Well demarcated +
hemorrhagic foci
Thick prominent
Normal**

Benign nephrosclerosis

**Small
Finely granular
Adherent**

**Fibrotic, atrophic, not
demarcated
Thick prominent
Increased**

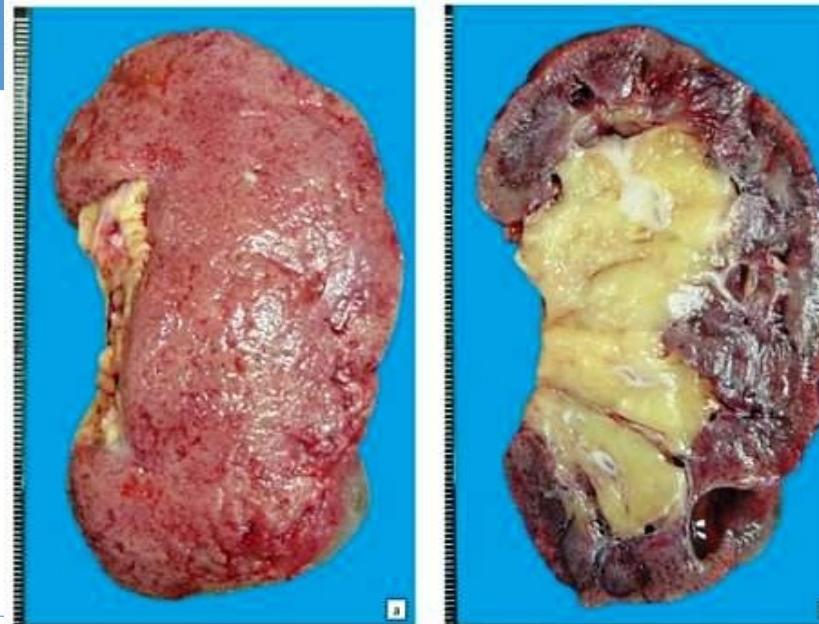
-2
Nephrosclero :sis
Size
Surface
Capsule
Cut section:
-cortex & medulla

- Arterioles
- Peripelvic

Pathological features of hypertension



Malignant
nephroscl



http://intranet.tdmu.edu.ua/data/kafedra/internal/patologanatom/classes_stud/en/med/lik/ptn/pathomorphology/3/08_Atherosclerosis.files/image012.jpg

Benign



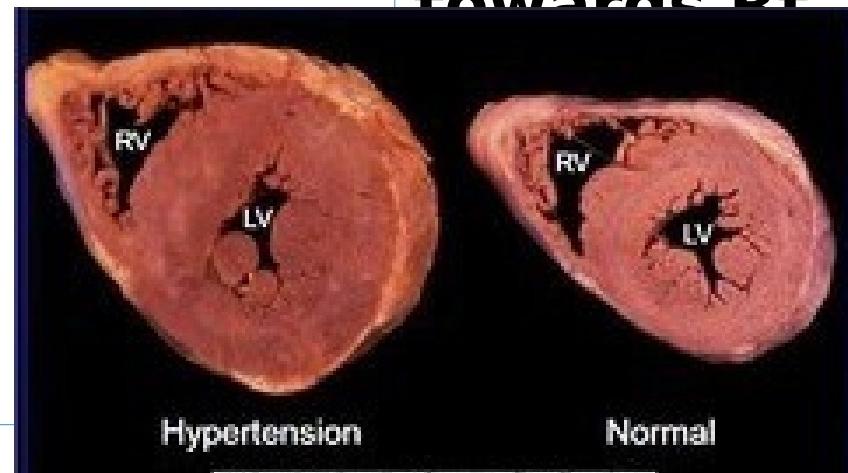
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Pathological features of hypertension



Malignant hypertension

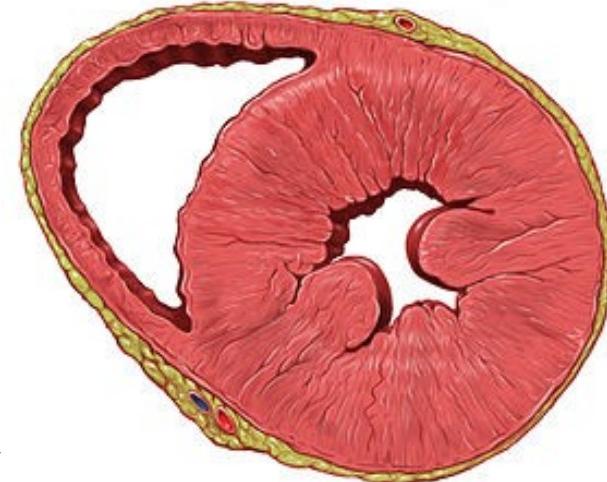
- Mild Lt. V. hypertrophy



Benign hypertension

- Marked concentric hypertrophy of Lt. V.
- Bulge of interventricular septum towards Rt. V.

Heart -3 :lesions

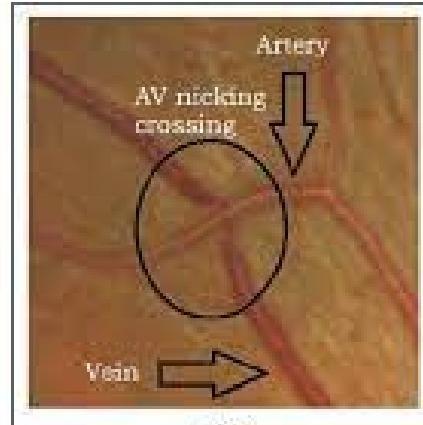


Pathological features of hypertension



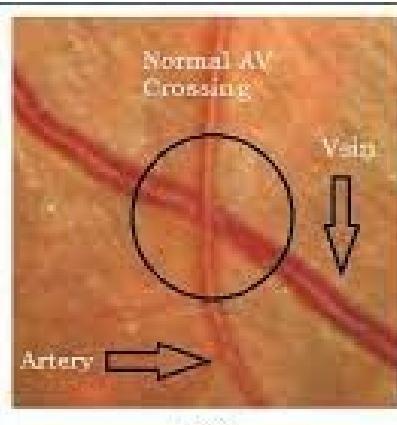
Malignant hypertension

Sever retinal **vascular VC** leads to
Papilledema + retinal Hge & exudate (cotton wool white spots)

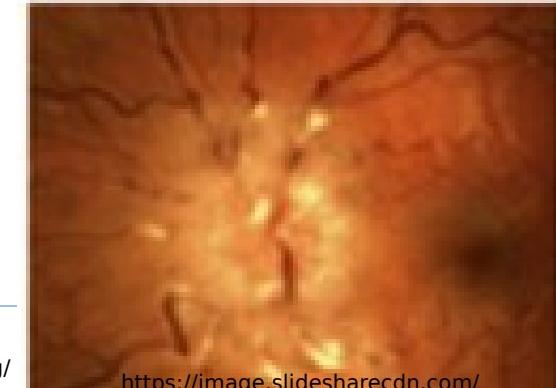
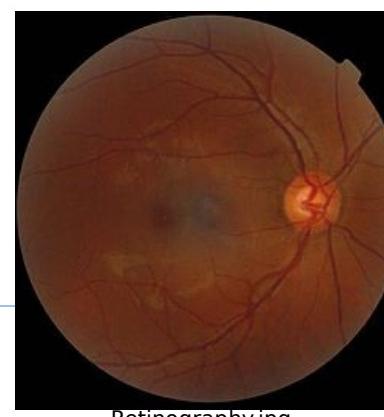


Benign hypertension

Arterial **thickening & narrowing** leading to compression of retinal vein vein narrowing
retinal exudate



4- Retinal lesions: Hypertensive retinopathy



Pathological features of hypertension



Malignant hypertension

Benign essential hypertension

Microaneurysms of cerebral arteries
Thrombosis & hemorrhage (stroke)

Acute renal failure (95%)

Cerebral hemorrhage

Heart failure

Heart failure (60%)

Cerebral hemorrhage (30%)

Renal failure (10%)

**Pathology:
5- Brain
lesions:**

**Cause of
death:**

Aetiology & pathological features of essential hypertension (Quiz)



What is the most common cause of death in malignant hypertension?

- A. Renal failure.
- B. Congestive heart failure.
- C. Cerebral haemorrhage.
- D. Respiratory failure.
- E. Coronary insufficiency.

Aetiology & pathological features of essential hypertension (Quiz)



What is the most common cause of death in malignant hypertension?

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Vasculitis

Definition: Inflammation of the vessel wall (Arteritis, phlebitis, capillaritis)

Types: 1) Infectious: Bacterial or fungal infection

2) Non infectious:

➤ Hypersensitivity vasculitis: immune mediated diseases with immune complex deposition in vessel wall:

e.g. - Polyarteritis nodosa.

- Systemic lupus erythematosus.

- Wegener's granulomatosis.

➤ Buerger's disease.





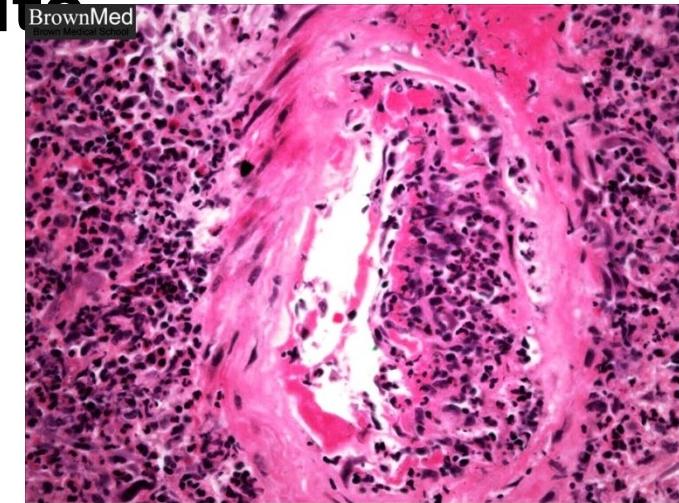
Polyarteritis nodosa

Definition: Autoimmune collagen disease affecting **small & medium sized arteries of any organ EXCEPT the lung** (e.g. heart, brain, kidney...etc).

Morphology: Segmental fibrinoid necrosis + acute inflammation of arterial wall

Complications:

- 1. Thrombosis**
- 2. Embolism & organ infarction.**
- 3. Mycotic aneurysms (due to dilatation of fibrotic parts).**
- 4. Hemorrhage (due to aneurysm rupture).**



n+of+this+artery.jpg



Buerger's disease

Synonym: Thromboangiitis obliterans

Definition: A segmental inflammation of medium & small arteries that spreads to adjacent veins & nerves (i.e.

- involves artery + vein + nerve
- Affects heavy smoking, middle aged males

Complications: Extremities.

1. Ischemic changes and ulceration
2. Intermittent claudications (sever pain in the limbs)



<https://cdn.savoir.fr/wp-content/uploads/sites/8/2012/01/Maladie-de-buerger.jpg>

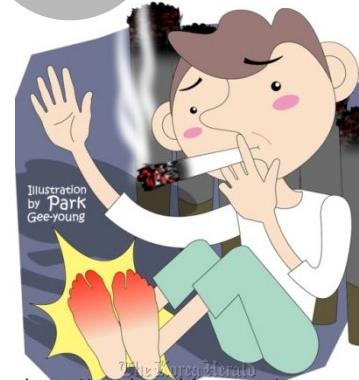
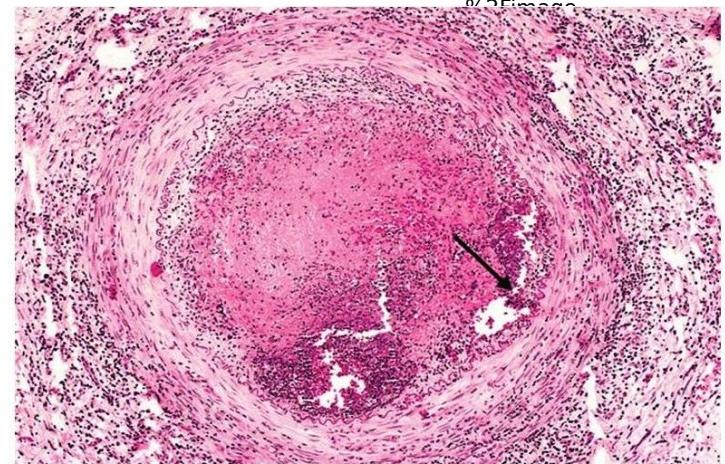


Illustration by Park Gee-young
http://res.heraldm.com/phpwas/restmb_idxmake.php?idx=68&simg=%2Fcontent%2Fimage%2Fimage_68.jpg



Thromboangiitis obliterans (Buerger disease). The lumen is occluded by a thrombus containing abscesses (arrow), and the vessel wall is infiltrated with leukocytes.
https://images.slideplayer.com/30/9519996/slides/slide_29.jpg



Types of vasculitis (Quiz)

Which of the following is a risk factor of Buerger's disease?

- A. Female gender.
- B. Old age.
- C. Smoking.
- D. Obesity.
- E. Sedentary life style.



Types of vasculitis (Quiz)

Which of the following is a risk factor of Buerger's disease?

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Key points:

- **Hypertension is persistent elevation of blood pressure $> 140/90$.**
- **It is classified into primary & secondary, or benign & malignant**
- **Benign arteriolosclerosis is characterized by hyalinosis, elastosis and atherosclerosis**
- **Malignant arteriolosclerosis is characterized by fibrinoid necrosis and concentric hyperplasia of CT and smooth muscles**
- **The most common cause of death in benign hypertension is heart failure.**

Suggested Textbooks



1. Mitchell R. Blood vessels. In Robbins and Cotran pathologic basis of disease, 9th edition. Kumar, Abbas & Aster (eds). Elsevier Saunders.
Pages 487 to 491.

2. USMLE step 1 lecture notes, 2017. Kaplan INC, New York. Pages 103 -111

